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duces no breaking down of muscle, nor loss of aroma or flavor. The brine is of 18% salt. A temperature of 5°-20° F. will serve to freeze a large fish in three hours; a herring in twenty minutes. The better preservative results are due to the fact that in ordinary freezing large ice crystals are formed in and among the muscle fibres. This breaks up the texture of the flesh. In the brine freezing the tissues are unchanged because only small crystals are produced.

FOOD OF YOUNG FISHES

Lebour (Jour. Marine Biol. Assoc. 1918, p. 433) states that some very young fish eat diatoms and other single celled organisms before they begin to eat animal food in the plankton. By a study of some fifty species she concludes, however, that all except a few vegetarian fishes, depend upon the small animals of the plankton rather than upon the algae. These food animals are Cladocera, Copepods, cirriped larvæ, and eggs. These crustacea feed freely on the microscopic plants.

STIMULI AND REACTIONS OF SAND CRAB

Mead (Univ. Cal. Zool. Publ. 1917, 16) reports experimental studies upon the sand crab so abundant on the tidal beaches of California. He found that the range of stimuli to which they are adapted is quite limited. Their eyes are effective, and guide them to their feeding beds and in the avoidance of enemies. Their feathery antennae aid them in capturing small organisms for food.

Their most striking reactions are in burrowing when uncovered, and in making their way back to the water when out of it. Two tendencies aid in the latter reaction; (1) they tend to run down slopes; (2) when not further than 200 feet from the ocean they tend to go toward it, even when they cannot see it. Even tho near the ocean they will, however, follow a 7 per cent slope away from it.

REACTIONS UNDERLYING THE DIURNAL MIGRATIONS OF VARIOUS PLANKTON ANIMALS

Esterly (Univ. Cal. Zool. Pub., April 4, 1919) reports experimental studies of the behavior of various plankton animals in the laboratory, conducted with the purpose of determining the factors that account for their diurnal migrational habits in nature. The author calls

attention to several definite reversals of response in laboratory conditions as compared with what is shown immediately after being taken from the sea. This greatly complicates the practical problems.

In general the plankton animals of a given species are more numerous at higher levels and less abundant at lower. One form may range from the surface to 100 fathoms, and another from 100 to 200 fathoms. What are the factors which operate to produce this result? The rhythmic quality suggests that the action of light in day and night is responsible. Clearly, also gravity, increase of pressure, salinity, temperature, and the like enter along with light into the problem. Equally also there may be internal or physiological rhythm apart from anything external.

The following general conclusions are suggested:

- (1) That no general explanation will hold for all the forms, in as much as there are quick specific reversals in behavior under stimulus.
- (2) While there are some experimental reversals of geotropism, change in geotropism because of change in light intensity cannot account wholly for vertical migration as a general phenomenon. Geotropism is, however, usually positive when the light is vertically above the water.
- (3) The same limitations must be made with respect to changes in temperature as explanatory of general migrations.
- (4) Physiological rhythm is shown in some species, under certain conditions, and may enter into the explanation of diurnal migrations.

ARCELLA EXCAVATA NOV. SP.

Habitat: Found in small swamp along with other varieties near Durham, N. C. First noted occurrence Dec. 9, 1918.

Shape: Somewhat like a quarter-section of cantaloup, the mouth being situated in the cup.

Size: Length 55μ , width 50μ , total depth 45μ , depth of depression 25μ , mouth $15 \times 20\mu$.

Color: Brown to almost black.